Mobile Development
With Xcode for J2ME Devices

Session 627

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Enterprise IT

Mobile Development With Xcode for J2ME Devices

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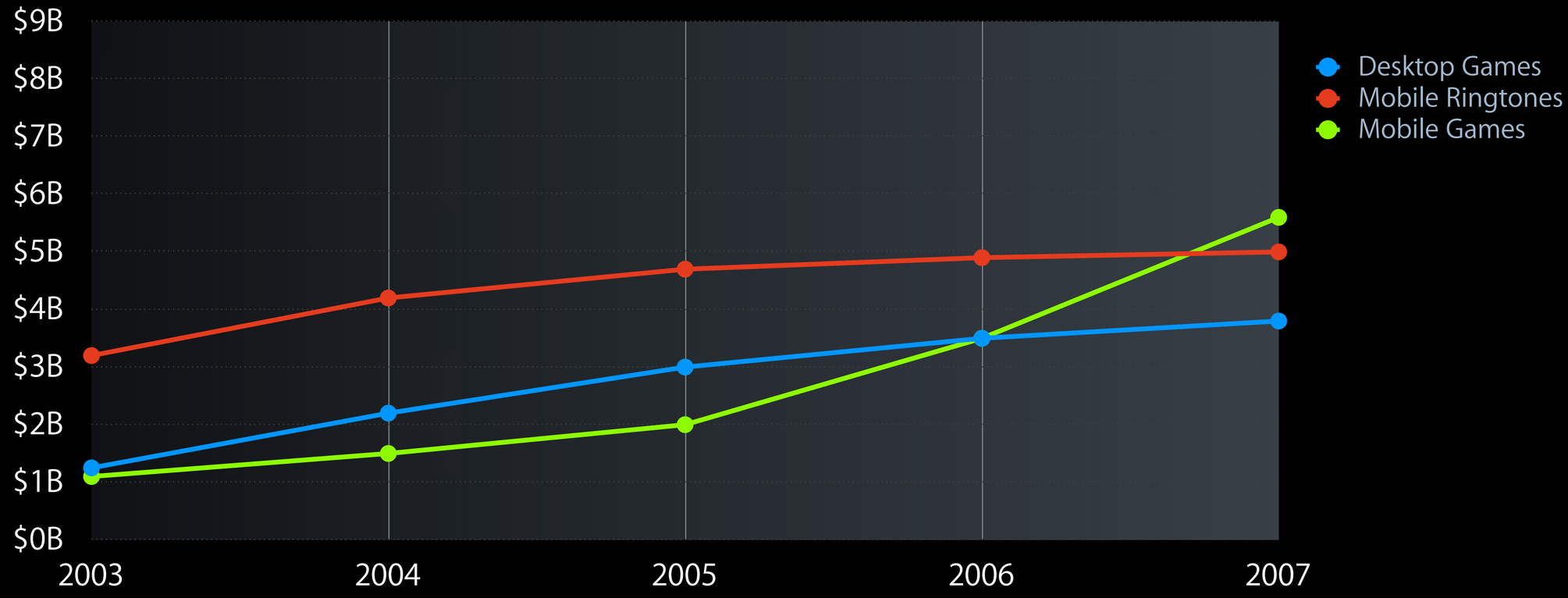
Mobile Development

What is it good for?

- Personal: the “third screen”
  - Keys, Wallet, Phone
  - Individual: not shared, personalized
  - Demographics: 50/50: m/f young/old
- Connected
  - Web services: think Dashboard Widgets
  - Thin Clients: think MathME
- Entertaining
  - “Casual games”: pick-up-and-put-down puzzlers
  - Moore’s law in full effect: playstation-quality 3D graphics
  - Games are a very hot market

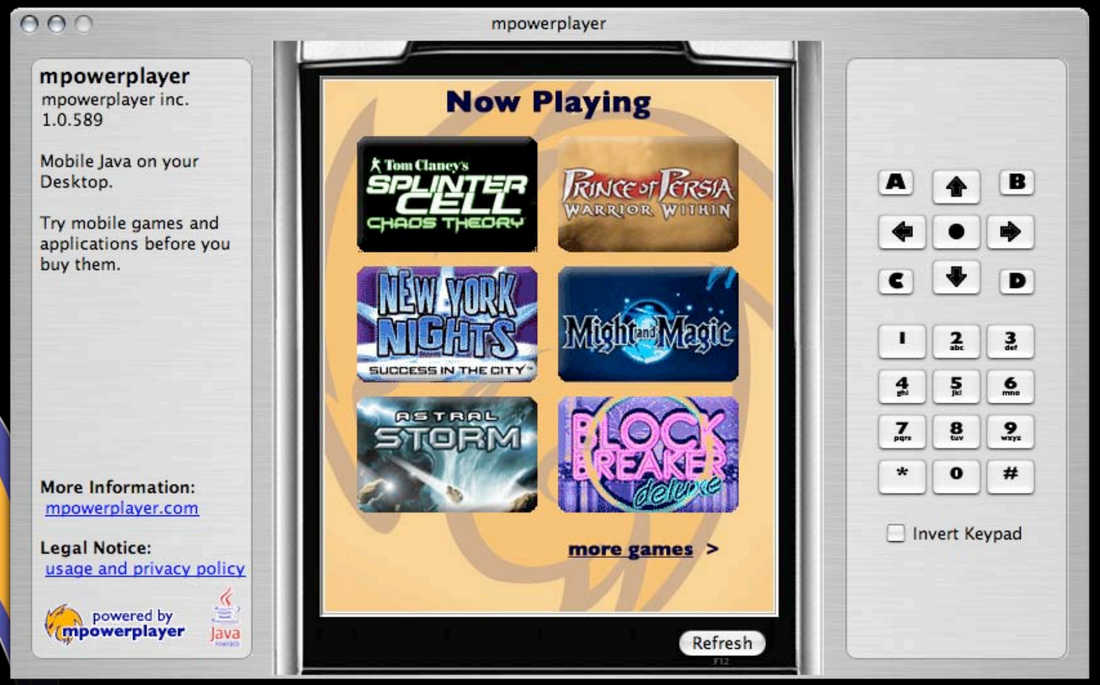
Market for Entertainment Software



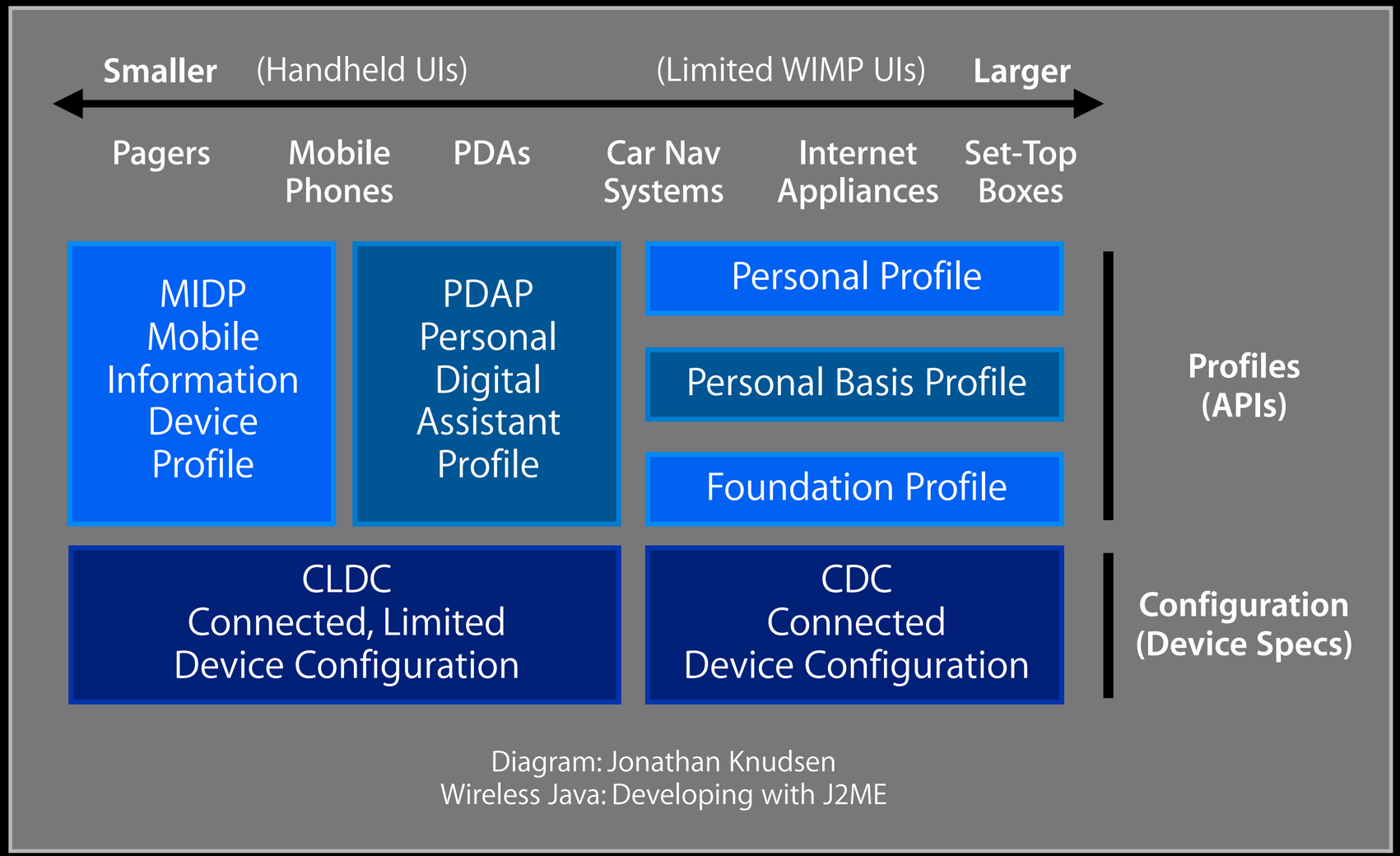
Source: PriceWaterhouseCoopers, IDC

Mobile Application Demos

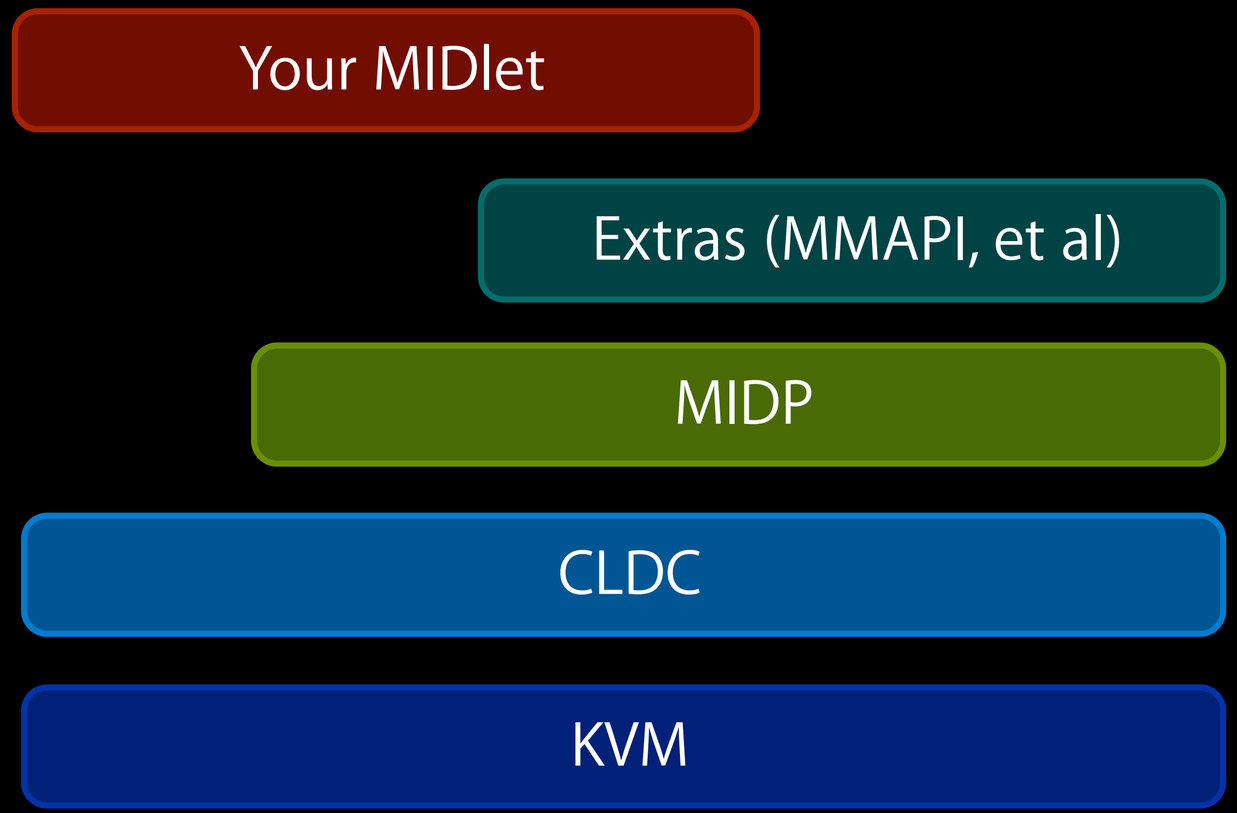
Powered by mpowerplayer



J2ME Universe



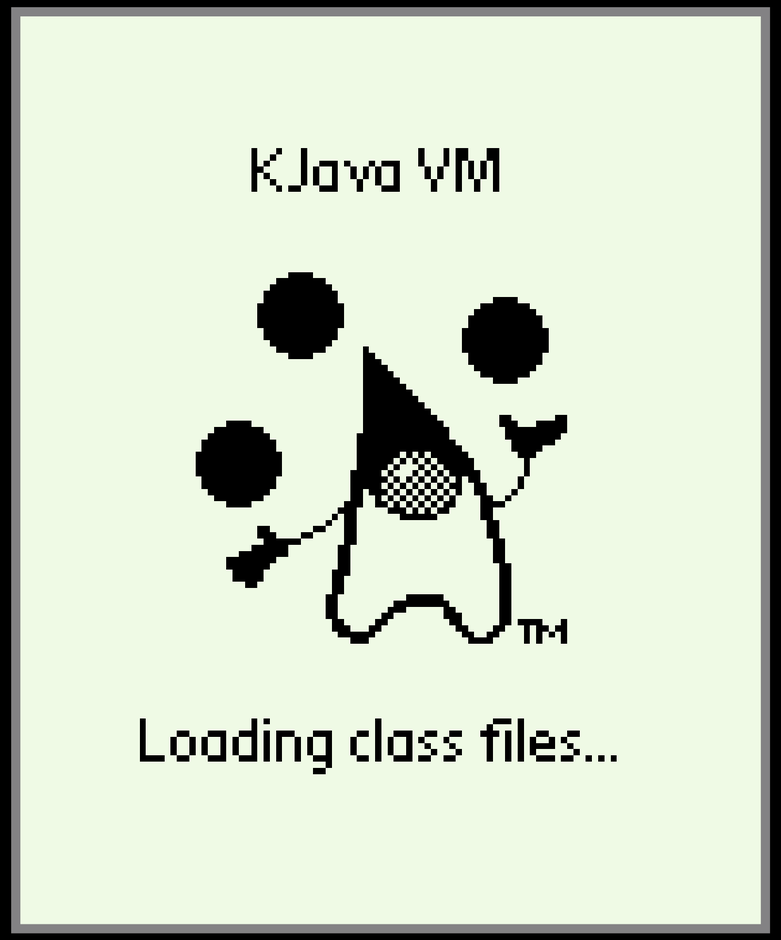
MIDlet Technology Stack



Virtual Machine (KVM)

The “k” virtual machine

- Minimum Specs
  - 32k heap, 8k persistent storage
  - 96x54 pixels (no color required)
  - http networking
- Typical Specs circa 2004
  - 200k heap, 5Mb persistent storage
  - 128x128 pixels, 4096 color
  - http, https, some have sockets
- 2005 and beyond!
  - Megs of heap, QVGA resolution, 3D hardware acceleration



Connected Limited Device Configuration (CLDC)

- Defines the required core features of the mobile runtime
- CLDC 1.0
  - Subset of the Java Language Specification
    - Portions of java.lang, java.io, java.util
    - Missing: Reflection, Serialization, File IO, Lists/Maps/Sets
- CLDC 1.1
  - Adds: Floating Point, Weak References
- Note: MIDP 2.0 does not require CLDC 1.1

MIDP 1.0

250 Million handsets in use today

- Low-level UI
  - Input: Handset Keypad and Pointer abstraction
  - Output: Canvas with basic graphics primitives
- High-level UI
  - Standard Widgets and Form API
- Networking: HTTP
- Persistence support: simple byte-array storage
- Image support: PNG and optional JPEG
- Audio support: none (!)

MIDP 2.0

Deployed and growing fast—One billion by 2007

- Low-level UI: new "Game API"
  - Sprites, Layers, region copy, mutable images, RGB access
- High-level UI
  - Custom UI Widgets, access to native themes
- Networking
  - HTTPS, Sockets, SSL/TLS
  - "Push" registry: launch in response to incoming connection
- Persistence: shared record stores
- Audio support: ABB and optional MMAPI (akin to JMF)
  - AIFF and WAV required, MIDI, AMR, MP3 optional

MIDP Optional Packages

- Mobile Media API (MMAPI)
  - Similar architecture to JMF: Players and Controls
  - Audio playback and capture, image capture, video playback
- Scalable 2D Graphics (M2G: JSR 226)
  - Playback and manipulation of SVG content
  - Support for rendering vector graphics in Graphics/Canvas
- Mobile 3D Graphics (M3G: JSR 184)
  - Scenegraph API similar to Java3D
  - Simple, cross-platform, 3D API suitable for games
- Supported by newer handsets from
  - Motorola, Nokia, SonyEricsson, others too

JSR-184 Demo

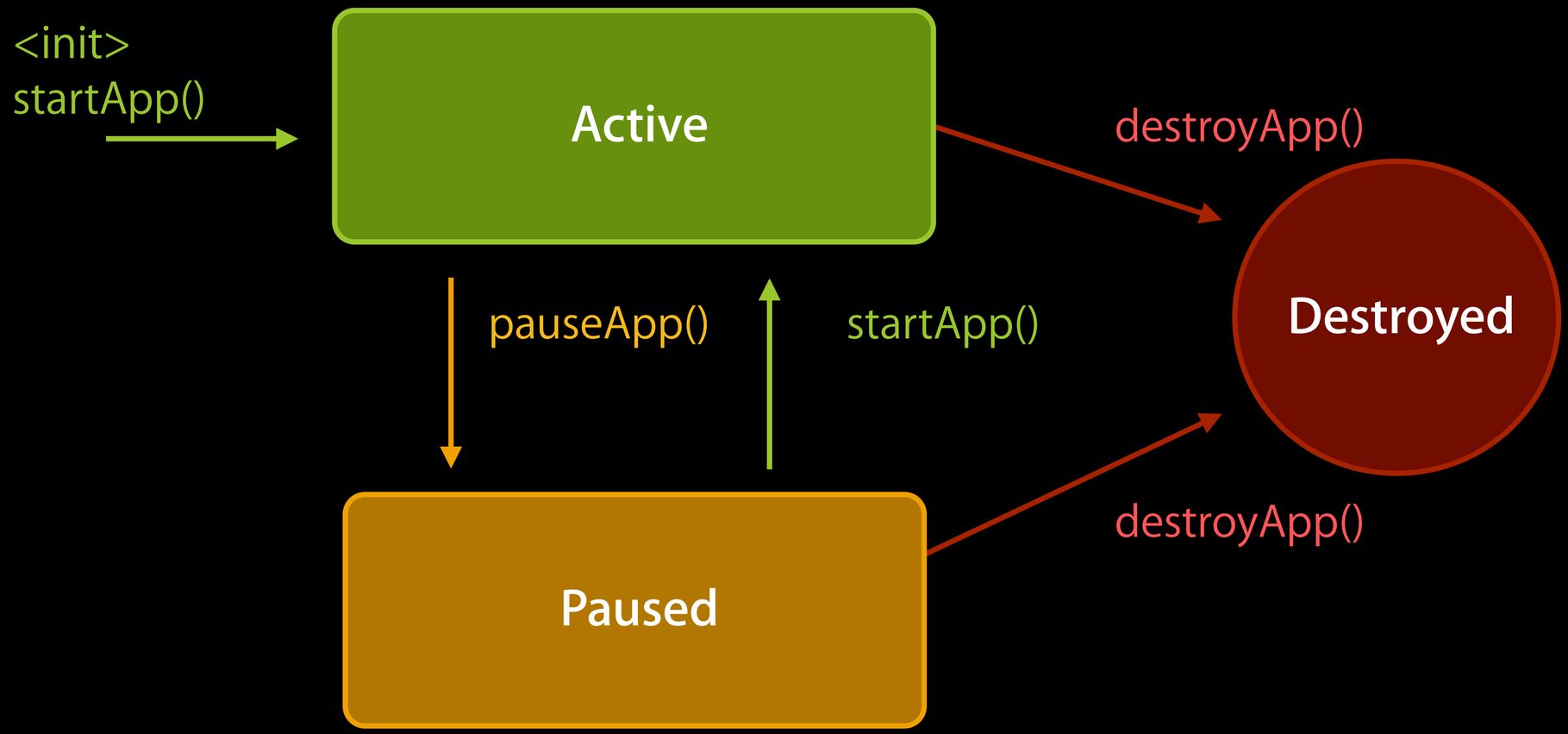
Mobile 3D Graphics for J2ME

What Is a MIDlet?

- JAR file
  - All classes, images, sounds, resources
  - Entry point: a subclass of javax.microedition.midlet.MIDlet
  - Classes must be “preverified”, may be signed
  - Typically 100s of K in size, but some devices enforce 64k limit

- JAD file: “Java Application Descriptor”
  - Text file in Properties format
  - Metadata for the application, duplication of data from Manifest
  - Name, Vendor, Version, Size, Requirements
  - A “preview” for devices to download before downloading JAR

MIDlet Life Cycle



MIDlet Build Cycle

Build	Preverify	Obfuscate	Jad: correct jar size	Run: mpowerplayer	Profile: Shark	Debug: Xcode	Deploy

Post-Build Targets

- Preverify
  - First step in J2ME Security
  - Annotates class files
  - Enables fast verification on mobile device
  - Required step in build process
- Obfuscate
  - Useful to reduce the deployed size of MIDlet
  - A number of options
    - Jode, ProGuard
    - Free, open source, and/or commercial
- JAD file
  - Automate the population of the MIDlet-Jar-Size property

Run With mpowerplayer

- Where it is
  - http://mpowerplayer.com/sdk
  - Free as in beer
- What it is
  - Pure Java J2ME Emulator/SDK
    - MIDP 2.0
    - MMAPI, M2G, M3G, Bluetooth
- What it isn't
  - Not the WTK: no packet sniffer, memory profiler, speed throttler
  - Not an IDE: we focus on what we do best
- Integrates with your existing tool chain

How It’s Done

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Debug With Xcode

- Custom executable
  - Launch Emulator passing in URL to Jar
- Debug Emulator process
  - Set breakpoints in your code
  - Debug Java like normal

Profile With Shark

- Setting the emulator up for profiling
  - -XrunShark
- Classes to exclude
  - java.awt.*,javax.swing.*, etc.
- Realities of profiling an emulator
- Packages help

Deploy to Device

- Bluetooth
  - JAR only
  - Mainly for testing
  - Bluetooth File Exchange App
    - /Applications/Utilities
    - Push over pre-verified Jar
- HTTP
  - Closer to real world
  - Requires Static IP
  - Works with Apache

Configuring Apache

- Add to mime.types file
  - text/vnd.sun.j2me.app-descriptor jad
  - application/java-archive jar
- Mac OS X Client
  - /etc/httpd/mime.types

Hands-on: What Are We Going to Do?

- Build a game using MIDP 2.0
- In the Emulator
  - Run the MIDlet
  - Debug the MIDlet
  - Shark the MIDlet
  - Deploy via Bluetooth

Develop, Debug, and Deploy

http://developer.apple.com/wwdc2005/

More Information

http://developer.apple.com/wwdc2005/

Documentation, Sample Code, and Other Resources

http://developer.apple.com/wwdc2005/

WWDC2005

Worldwide Developers Conference